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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/523,567	08/29/2005	Gerhard Wotting	PO-8454/CF1-10	1372
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CONNOLLY BOVE LODGE & HUTZ, LLP			EXAMINER	
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WILMINGTON, DE 19899				
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			1731	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/523,567

Applicant(s)

WOTTING ET AL.

Examiner

Russell J. Kemmerle

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 July 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8, 10, 11 and 13-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8, 10, 11 and 13-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

Claims 8, 10, 11 and are 15-18 rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura (US Patent 6,314,798) in view of Yeckley (US Patent 5,508,241).

Nomura discloses a method of making cutting tools and wear-resistant materials (such as ball bearings) of silicon nitride (Si_3N_4) sintered bodies (Col 1 lines 11-14).

The method taught by Nomura is exemplified in the method of example I (Col 5 line 35-Col 6 line 40). It involves mixing a Si_3N_4 powder with various amounts (between 0-6wt%) of MgO , Al_2O_3 , Y_2O_3 , Yb_2O_3 , Ce_2O_3 and ZrO_2 or combinations thereof powder. The powder added to the Si_3N_4 powder acts as a sintering aid (Col 5 lines 61-67), and may be added in an amount of 1-50 wt% (Col 1 lines 49-52).

This powder is then wet ball milled in ethanol to form a slurry (Col 6 lines 14-17). The slurry is then passed through a 325-mesh sieve (removing particles greater than about 45 μm), and then an organic binder is added to the slurry. The slurry is then spray-dried to form a dry granulated powder (Col 6 lines 19-22).

This powder is then heated at three different stages. First it is heated at 873K (600°C) for 1 hour in a N_2 atmosphere of 1 atm (approximately 1 bar) (Col 6 lines 23-28). Second, it is heated to 1973-2023K (1700-1750°C) for 4 hours in a N_2 atmosphere of 100-300 kPa (approximately 1-3 bar) (Col 6 lines 30-34). Finally, it is heated at 1973-

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2023K (1700-1750°C) for 2 hours in a N₂ atmosphere of 10-100 MPa (approximately 100-1000 bar) (Col 6 lines 34-39).

While Nomura generally discusses the use of the invention as related to Si₃N₄ powders, it also specifically states that it could be used with other ceramic materials, such as Zirconia based ceramics (Col 10, lines 55-64).

While Nomura does not specifically disclose that the final ceramic material would be free of at least one of macroscopic defects larger than 20µm and optical heterogeneities larger than 50µm, Nomura teaches substantially the same process using substantially the same materials as the current disclosure, and thus would inherently create a final ceramic material that was free of such defects.

Nomura fails to teach that the slurry is passed over a magnetic separator, contains an organic additive consisting of polyacrylates, polyvinyl alcohol, polyglycols or polyvinylpyrrolidone, and is dried at a temperature below 200°C (or 250°C for claim 11).

Yeckley discloses a method of forming a sintered Si₃N₄ article by heating a powder at an elevated pressure. The method involves mixing a Si₃N₄ powder and other additives in a solvent to form a slurry, which is then passed through a filter and a magnetic separator to remove undesired particles. An organic binder, specifically polyvinylpyrrolidone (PVP), is then added to the slurry, which is then spray dried to form a granulated powder, which can be used to form a ceramic article to be sintered (example I, Col 2 line 45-Col 3 line 4).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to have modified the method of forming a Si₃N₄ article as taught

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by Nomura by passing the slurry through a magnetic separator to remove magnetic impurities and using PVP as the organic binder. The motivation to add the magnetic separator purification step would have come from a desire to remove magnetic impurities (particularly iron) that can reduce the quality of Si_3N_4 articles (see Pujari, US Patent 5,759,481, Col 4 lines 53-65). The motivation to use PVP as the binder would come from Nomura's disclosure that an organic binder should be added, and Yeckley's teaching that PVP is an effective organic binder for use with Si_3N_4 .

While Nomura and Yeckley both disclose drying the slurry (specifically spray drying), neither specifically discusses at what temperature the drying operation should be carried out at. However, since both use solvents having a relatively low boiling point (Nomura uses ethanol having a boiling point of about 78°C and Yeckley uses isopropyl alcohol having a boiling point of about 82°C), it would be obvious to one of ordinary skill in the art that drying could be done at any temperature above those boiling points, since that would be sufficient to drive off the liquid. Therefore it would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, that the drying step taught by both Nomura and Yeckley be carried out at less than 200°C since temperature much lower than that would be sufficient to dry the slurry, and heating past what would be needed to dry the slurry would be wasteful and unnecessary.

Allowable Subject Matter

Claims 13 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Prior art was not found which disclosed a method similar to that discussed above discussed above and included a first sintering stage that takes place under nitrogen or inert gas at a pressure of 10-50 bar.

Response to Arguments

Applicant's arguments filed 23 July 2007 have been fully considered but they are not persuasive.

Applicant argues that the combination of Nomura and Yeckley is based on hindsight, and therefore improper, because Yeckley discloses a different firing cycle than that used by Nomura and the present invention.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Further, Yeckley is not used to teach the firing cycle of the current invention, but is instead used to teach the method of forming a Si_3N_4 slurry in the same manner as the present invention, specifically, the use of a magnetic separator to increase purity and the use of PVP as the binder. Thus, one practicing the invention of Nomura would have

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been motivated to use the magnetic separator taught by Yeckley as a way of creating an improved slurry with fewer magnetic impurities.

Conclusion

Applicant's amendment necessitated any new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russell J. Kemmerle whose telephone number is 571-272-6509. The examiner can normally be reached on Monday through Friday, 8:30-4:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/RJK/


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